INDUSTRIAL STANDARDIZATION

APR 17 1933

A MONTHLY REVIEW

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The American Standards Association is organized to provide systematic means of cooperation in establishing American Standards to the end that duplication of work and the promulgation of conflicting standards may be avoided; to serve as a clearing house for information on standardization work in the United States and foreign countries; to act as the authoritative American channel in international cooperation in standardization work

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A Turning Point in Russian Standardization

by

I. Gutmann, *Associate Editor*
Engineering Index

A review based on official documents and on a statement by A. K. Gastev, chairman of the All-Russia Standardization Committee

Russian government standardization undoubtedly arrived at a decisive turning point when the Soviet of the People's Commissars (Sovnarcom) of U.S.S.R. published its decree number 1,928 on June 15, 1932. This decree, which was preceded by the appointment of A. K. Gastev to the post of chairman of the All-Russia Committee on Standardization, provides for a radical change in standardization policies, involving a large degree of decentralization in standards-making and greater emphasis on standardization research. The decree brings the methodology of standards-making in the U.S.S.R. into close resemblance with the practices in the United States and other countries having national standardizing bodies.

The decree provides that ". . . the work of the All-Russia Committee on Standardization, which heretofore consisted in the development of a tremendous number of detail standards, is to be concentrated on the establishment of definitive standards on the fundamental engineering and production problems of the national economy." It also urges an intensified tempo in the standardization of the machine construction, metallurgical, and fuel industries. The Government Quality Inspection Bureau is abolished and its part is assigned to the administrative branch of the Standardization Committee.

A statement by A. K. Gastev, the new chief of the All-Russia Standardization Committee, which explains and amplifies the provisions of the June decree of the Soviet of the People's Commissars, opens the current issue of the official organ of the Committee.

According to Gastev, the enormous value of Russian standardization is due not so much to its economy—which results in annual savings estimated at hundreds of millions of rubles—but in its serving as a powerful and indispensable tool of planned industrial reconstruction, and as the foundation of a veritable industrial and technological revolution. This will enable the country to mobilize and liquefy its technical resources at short notice, thus making feasible a perennial, never-ceasing process of modernization and renovation of the economic life of the country. In the socialist commonwealth of Russia, says Gastev, standardization manifests and confirms the planning principle in national economics, in contrast to the anarchic and catastrophic industrial activity of competitive capitalist states. Government standardization, being so powerful a tool, is naturally pregnant with great dangers; if misapplied, it may put heavy shackles on the development of an industry.

In reviewing the eight-year experience of the All-Russia Committee with centralized standardization, Gastev says that the work of the Committee has suffered from inherent bureaucratic evils. Important technical problems have often been treated in amateurish fashion, following political and social slogans without due critical examination of the nature of the problems to which they were applied. In its desire to have the maximum number of standardization sheets to its credit, the All-Russia Committee has merely summarized and approved the recommendation of sundry industrial organizations, without exercising upon them that directive influence for which the Committee presumably had been created. Thus, chasing after numbers, the Committee had no time left for a generalization of the country's standardization experience, or for an intensive study of standardization methodology for the purpose of creating definitive models of standardization technique particularly intended for scientific research institutes. On a number of occasions, when approved standards were referred back to the All-Russia Committee for correction, it was discovered that in reality the standards had not been adopted or followed in industrial practice. The Committee had no time to see that approved standards were incorporated in practice, nor had it time to direct and instruct as to how standards should be introduced and their enforcement guaranteed.

The decree of June 15, 1932, relieves the All-Russia Committee of the preparation of specific

standards of details and relegates this work to the National Committees of individual industries, such as the People's Committee of the Lumber Industry, the People's Committee of Heavy Industries, etc. Henceforth, the All-Russia Committee on Standardization is to exercise only a guiding, regulating influence on the making and enforcement of standards. It is also presupposed that the research institutes of the country will lay down the fundamental principles of the standards on the basis of latest knowledge and will draw attention to bureaucratic survivals in the details of previously adopted standards. The All-Russia Committee will dig deeply into the nature of standardization and its processes, the theory of standardization of manufactured products, standardization of equipment, raw materials, etc. It will of necessity become a central research institute on standardization methods, guiding other organizations in the most basic problems of standardization methodology.

The past regime of the All-Russia Standardization Committee ignored the results of standardization experience in foreign countries. Now the decree of the Council of People's Commissars makes it practically mandatory that such experience be studied and transplanted, with proper discretion, of course. The importance of this decision will be appreciated if we recall the enormous export and import trade of Russia. This implies a study of standards for Russian raw materials and foreign manufactured products and equipment which will not be merely academic, but which promises to involve serious political considerations of international import.

Warns against premature standardization

Gastev issues an earnest warning against premature and too-sweeping standardization of testing methods and manufacturing processes. He speaks ironically of the engineers proposing standardization of most of the technological processes for the Second Five Year Plan. It seems that they fail to realize the exceptionally revolutionary character of modern engineering, and if they be not resisted and checked in time, standardization may revive the ways of medieval craftsmen as fossilized in trade union codes. The extent and scope of standardization of manufacturing processes should be determined not only on the basis of present-day, rather violently fluctuating practices, but also on the basis of the latest research. For example, what shall we standardize in machine construction—the technological process with its flow of operations or the various methods of metal cutting? If we lean to the latter alternative we should not be too specific. Rules for rate of feeding, depth of cutting, alignment charts, etc., may be given in the form of an appendix to the standard, merely as a definite illustration that should by no means be incorporated in the standard proper. It is too much to speak of standardization of concrete technological processes; it would be quite an achievement if we could merely formulate definite standards for the documents describing the arrangement of a process in space and time, the structural architectonics of a process, so to speak.

Abolition of Quality Inspection Bureau

Gastev is very well pleased with the abolition of the Government Quality Inspection Bureau of the All-Russia Standardization Committee, for he can see no connection between the proper activities of the two. The first was a sort of policing agency for the safeguarding and maintenance of a certain minimum of quality, without any regard to upper limits of quality. This is said to have produced confusion in the work of the parent standardization body—the All-Russia Committee—for the latter set both a lower and an upper limit to quality, in accordance with the functions and uses of the item standardized. Standardization aims to define quality categories in quantitative terms, avoiding the use of such words as better, inferior, poor, etc. Furthermore, these quality categories are based on uses and functions; thus, special diet breads, bread for normal healthy people, and bread for conditions of civil war emergencies, may all be one hundred per cent up to standard but will greatly differ in quality, and therefore, in specifying categories of bread, it will be just as important to set an upper limit of quality as a lower one.

The evaluation of the effectiveness of standards is discussed by Gastev at some length. Effectiveness should be rated with regard to the impression made by the standard on the preparatory stage prior to manufacture, on the manufacturing process itself, on the assembling process, the storage, the transportation, and the distribution of the product. Its bearing on the principle of interchangeability of parts and its status with reference to an inter-related and inter-connected organization of industry should not be forgotten. It should be noted how the individual standard harmonizes with the general scheme of socialist reconstruction, how it agrees with the most advanced tendencies in modern engineering, what changes it introduces in conditions of labor and the routine of life, what savings it produces, directly or indirectly, through a secondary effect on inter-related branches of industry. In general, the direct effectiveness of a standard can be sensed most

readily through a resultant increase in the mass production possibilities of a product or process. Every standard is bound to bring about a more intensified specialization and a more pronounced cooperativeness based on mass production. An effective standard is inevitably the instrument of a radical change in the industry and in its organization.

The durability or permanence of a standard may serve as a criterion of its effectiveness. The fact that a standard has to be revised annually or semi-annually invariably indicates that it is not based on a stable engineering foundation, and that it is on a low level of technical civilization, so to speak. There is no sense in issuing standards which are good only for very limited periods—if this happens too often, it is time to stop this kind of standardization and reconsider the subject from first principles.

Standardization law is becoming a matter of pressing importance in Russia, requiring the application of most expert economic and juristic thought to its solution and enforcement. From a legal point of view the following classification of standards is advisable: compulsory standards, temporary standards, and recommended tentative standards. These classes will have to be clearly defined in precise legal terminology, these definitions to be borne in mind by makers of standards. It will also be necessary to state at what period the revision of the standards will probably become necessary—an act requiring some courage and imagination.

Gastev's article closes with an appeal to the 500 research institutes of new Russia to come to the aid of the standardization movement and to work out standards based on engineering research.

British Conference Recommends Lumber Standards

A conference convened by the British Standards Institution in November, 1932, recommended to the B.S.I. that a committee be set up immediately to prepare a series of British standard specifications for timber, including sizes and grading. The conference included representatives of all timber supplying and using interests in the United Kingdom, as well as representatives of the British Columbia Lumber Millers, and of the Australian, New Zealand, and South African Governments. The *Canada Illustrated Weekly* of London, reporting the results of the conference, says:

"This step should have far-reaching effects in increasing trade between the Mother Country and Canada in particular among the timber-growing countries of the Empire. One of the main obstacles to this trade has been differences in standards and specifications, and it may be hoped that these are now about to be removed by the means suggested."

New Zealand Standardizing Body

New Zealand has entered the ranks of countries having national standardizing bodies, with the organization of the New Zealand Standards Institution, which has established headquarters at Wellington. This is the twenty-second national standardizing body to be established and the fourth in the British Empire, the others being in Great Britain, Canada, and Australia.

Suggest International Standardization of Tests for Fusion Point of Coal Ash

L. Bro in *Journal des Usines à Gaz*, 1932, 56, 422-431, reviews the standard methods adopted in various countries and laboratories for the determination of the fusion point of coal ash as regards heating conditions, the stage of deformation of the test piece attained in the test, and the terms employed for reporting the result of a test. The factors concerned in the test are discussed, and a plea is made for international standardization of the test conditions. It is suggested that contracts for the purchase of coal should include a clause covering the fusion point of the ash with a penalty in respect of each 45 F by which the ascertained fusion point is lower than the stipulated vale, a tolerance of ± 45 F being allowed for experimental error. Thus the penalty would not arise unless the fusion point were 90 F lower than the specified value.—*Reprinted from the "Gas Journal," London.*

International Electrical Congress Papers Available

The ASA office has on file a set of the preprints of the 300 papers presented at the International Electrical Congress, Paris, 1932, which may be borrowed by ASA members. A note concerning the papers presented at the Congress appeared on page 231 of the August, 1932, issue of Industrial Standardization. A complete list of the papers may be borrowed from the ASA office. Through the courtesy of the Institute of Radio Engineers a translation of Tudor Tanasesco's paper, "Tests of Broadcast Radio Receivers," is available for loan.

Standard Tests for Metal-Cutting Tools[1]

by

Robert C. Deale[2]

The standardization of conditions and procedure for comparative shop tests of turning tools and tool materials

While there has been much discussion of the comparative value of the materials of which metal-cutting tools are made, little has been done to determine the relationships of cutting speed, tool life, feed, and depth of cut in various metals with different tools since the classical experiments reported by Frederick W. Taylor 25 years ago. Many data have been published, but when it is desired to compare two or more sets of results it is usually found that they are not at all comparable. Tool life is seldom given, while the description of the tool form, the specifications of the metal cut, and the material of which the tool is made are frequently incomplete. Information is often given as to the number of pieces that have been made with a single grinding of the tool, but this is seldom of value in comparing the tool in question with one used on an entirely different part or in setting up feeds and speeds for use on another piece.

The data supplied by the manufacturers of tool steel, stellite, and cemented tungsten carbide are generally so vague that users of these materials cannot take full advantage of the properties possessed by the tool. A shop that wishes to push tool performance to its economic limit must run its own tests and secure its own data. Few shops are willing to do this, and few have the necessary knowledge to run such tests on a laboratory basis, even though it is possible to do the work in the regular machine shop. As a consequence, few other than the large production shops have any real data on the properties of cutting-tool materials and their true comparative values.

While extravagant claims are made for some of these materials as compared with others, it is practically impossible for the production manager of a shop to take the published data on the subject and figure whether it will pay him to change from one type of tool to another. In most shops the mechanic is given a tool and is allowed to work out his own feeds and speeds by trial and error. The author has found that mechanics, unless given assistance as to the correct feeds and speeds to be used, will invariably fail to find the most desirable combination for use on a given cut. Charts giving standard speeds and feeds should be made up and posted at each machine for reference as necessary, or instruction cards, specifying the feed and speed for each cut, should be furnished.

To make full use of any charts or data, they should be presented so that they may be used directly in setting feeds and speeds for any part in any shop where the power of the lathe and the size and type of the tool are substantially the same as those in the test in question. In addition, the results should be directly comparable with those secured on any equivalent test.

To insure uniformity of results, so as to allow direct comparison, and facilitate shop use, cutting speeds should be given on the basis of some standard tool life, preferably a time that will correspond with an economical tool life in shop use.

Taylor did a major part of his work on the basis of a 20-minute tool life, running most of his tests the full time. However, he found in the course of his work that with a given high-speed-steel tool, making a specific cut in a given quality of metal, the life of the tool in terms of cutting speed could be represented approximately by the empirical equation:

$$VT^n = c$$

V = the cutting speed in feet per minute
T = the tool life in minutes
c = a constant, depending for its numerical value upon the exact cutting conditions
n = a constant, which appears to depend largely on the material of which the tool is made, although the form of the tool as well as the general testing condition may also affect it.

[1] Reprinted from *Mechanical Engineering*, October, 1932.

[2] Babylon, N.Y. Member-at-large on Sectional Committee on Standardization of Speeds of Machinery (Z18); representative of the American Society of Mechanical Engineers on the Sectional Committee on Classification and Designation of Surface Qualities (B46), which held its organization meeting on December 9, 1932.

H. J. French and T. G. Digges[3] concluded that the exponent $\frac{1}{7}$ fitted the results of all published experiments quite closely in the case of high-speed tools used for roughing cuts in steel. In another paper[4] the same two authors conclude that this exponent should be $\frac{1}{10}$ for finishing cuts in steel with high-speed-steel tools. Mr. Digges[5] has also shown that the experimental results with cemented-tungsten-carbide tools were closely represented by this equation with $n = \frac{1}{5}$. No data are available for stellite. While no exact information on the relation between cutting speed and tool life has been published, Taylor reports[6] that when cutting cast iron the tool life is somewhat greater than would be given by the steel formula.

Data necessary in metal-cutting test

To be complete, the results of any metal-cutting test should include the following data:

1. Cutting speed
2. Feed
3. Depth of cut
4. Tool life (with a notation as to the method of determining tool life)
5. Horsepower required (not absolutely necessary, but desirable)
6. Type of metal cut, giving complete identification, so that the test may be repeated if desirable. Steel may be designated by the S.A.E. number or by analysis. A hardness test, such as Brinell or Rockwell, is desirable, particularly if the steel is heat-treated before the test. Tests on cast iron should report the presence of any important alloying elements, such as nickel, while the Brinell number should be given as the best available indication of the hardness of the metal.
7. Material of tool. The heat treatment of high-speed-steel tools should be in general accordance with the recommended practice for heat treatment of the American Society for Steel Treating.
8. Dimensions of the tool
9. Shape of the tool
10. Rake and clearance angles of the tool
11. Description of machine on which the test was made. (As this is largely in order to indicate the possible influence of the machine in causing tool breakdown, any abnormal looseness in the machine should be reported, because of its great effect on the results.)
12. Definition of tool condition at the end of the test and method of determining the endpoint
13. The coolant used, if any, and the approximate quantity used per minute

Standardization of test procedure

Of the above, particularly in those tests designed to measure the relative value of various tool materials, there are a number of points that might well be standardized, in order to facilitate the comparison of results and make comparisons more reliable.

The author believes that the tool life should be standardized at a period which would represent average shop use between grindings, and that sixty minutes meets the requirements of the ordinary machine shop better than any other period. To secure economy of time and materials, tests should be made at a speed which will give a much shorter life, preferably five to fifteen minutes, and the results reduced to a 60-minute basis by the use of Taylor's equation, which, for this purpose, may be reduced to:

$$\frac{V}{V'} = \left(\frac{T'}{T}\right)^n \quad \text{or} \quad V' = \frac{V}{(T'/T)^n}$$

V = the speed during the test
V' = the speed at the desired standard tool life (suggested as 60 min)
T = the tool life on test in minutes
T' = the standard tool life in minutes (preferably 60 min)
$n = \frac{1}{7}$ for roughing cuts with high-speed-steel tools
$= \frac{1}{10}$ for finishing cuts with high-speed-steel tools
$= \frac{1}{5}$ for roughing cuts with cemented-tungsten-carbide tools

Before the first test cut is taken from a piece of stock, a light truing cut should be taken over it to make sure that the test cut will be of constant depth. Similarly a truing cut should be taken where a previous cut has been made with very heavy feed, or where the test piece is tapered. Any glazing of the surface caused by failure of the tool should be removed before commencing a test cut.

To insure a constant test speed, the work piece should preferably be long enough to cause failure of the tool in making a single cut over it. Few machines have a speed control accurate enough to make it certain that a second cut will be made at exactly the same surface speed as a previous one, and conse-

[3] See "Rough Turning With Particular Reference to the Steel Cut," Trans. A.S.M.E., vol. 48, 1926, p. 533.
[4] "Turning With Shallow Cuts at High Speeds," Trans. A.S.M.E., 1930, paper MSP-52-6.
[5] "Cutting Tests with Cemented-Tungsten-Carbide Lathe Tools," Trans. A.S.M.E., 1930, paper MSP-52-13.
[6] "On the Art of Cutting Metals," p. 161, par. 709.

quently an error will be introduced if two or more cuts should be taken in a single life test. Results of greater accuracy will be secured if several tests for every combination of feed and speed are averaged.

If a series of feed and speed combinations is tried, and if the results after they have been reduced to a

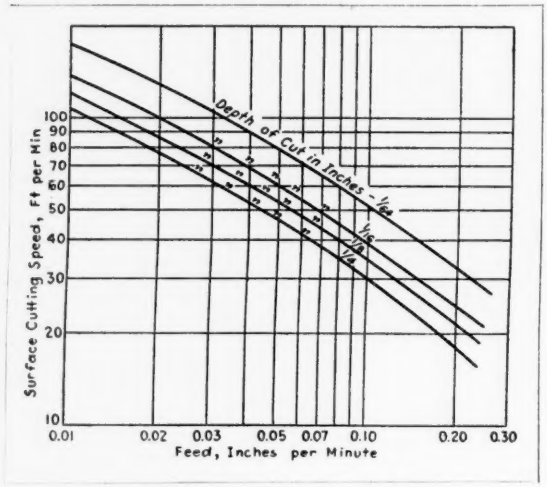

FIG. 1

Cutting speeds and feeds for various depths of cut

(½-in. high-speed-steel turning tool cutting cast iron of 170 Brinell hardness)

standard life basis are plotted, a curve such as those shown in Figure 1 will result. These curves have been replotted from Taylor's "On the Art of Cutting Metals," and are based on a tool life of 30 minutes. Test inaccuracies are very quickly revealed by such curves, making it possible to check results that are at variance with the bulk of the readings.

For tests designed to compare the quality of one cutting tool with another, the metal cut might well be standardized. Because of the fact that it is used in every shop, it is recommended that S.A.E. 1020 steel be used for all tests of this sort, except those on which it is desired to show the value of the tool for cutting cast materials, when an unalloyed gray cast iron having a Brinell hardness of 150 to 180 may be used as a basis.

To test the material of the tool only, a standard roughing tool might well be used. As the size of the tool affects the result, this also should be standardized. The author believes that a relatively small tool, in addition to being economical, represents the largest number of tools in use. A forged tool, ⅝ by 1¼ inches, should give results in line with those that would be obtained in a majority of shops. While a round-nose tool is generally used for roughing, the author prefers a tool of the type shown in Figure 2, with rake and clearance angles suitable for the material being cut. For S.A.E. 1020 steel, angles approximately as follows have been used:

A = top rake, 4 to 6 deg
B = side rake, 8 to 12 deg
C = side clearance, 6 to 12 deg
D = front clearance, 10 to 15 deg

The author believes that more consistent results can be obtained by dry cutting than by cutting with a coolant, as many lathes have no provision for the use of coolants and because even when such provision is made the quantity of coolant varies very greatly. The results secured without coolant are more readily duplicated; consequently it is recommended that all data except those designed to show the effect of the use of coolant be on the basis of dry cutting.

A summary of the elements to be standardized

The standardization of the following elements in testing metal-turning tools will be of great advantage in permitting direct comparisons of different sets of tests:

1. *Form.* All data shall be presented by means of curves showing the variation of cutting speed for each depth of cut and for each given size and form of tool.

2. *Tool life.* The cutting speed shall be computed

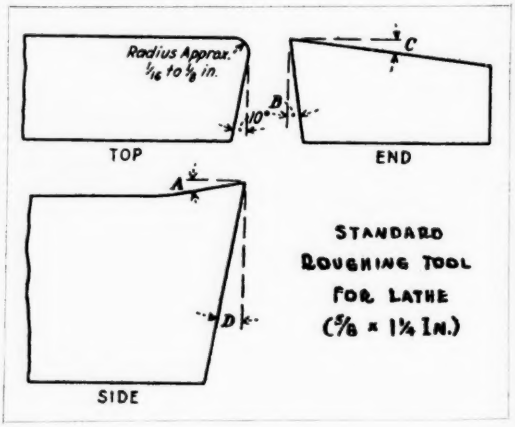

FIG. 2

from the average tool life by means of the equation $VT^n = c$, in terms of a 60-min tool life. If possible, six to eight tests shall be made for each condition investigated and the cutting speed computed from an average of these results. No cut of less than five minutes shall be used in the development of standard data.

3. *Metal cut.* All data made up for the purpose of comparing tool material and form shall be based on the cutting of S.A.E. 1020 steel, or of gray unalloyed cast iron having a Brinell hardness of 150 to 180.

4. *Tool.* All data made up for the purpose of comparing tool material and form shall be based on the use of a standard ⅜-inch by 1¼-inch forged roughing tool, ground as shown in Figure 2.

5. *Preparation of the work piece.* Before any test cut is taken the test piece shall be inspected, and if it is found to be eccentric, tapered, rough from a preceding cut taken with an unusually wide feed, or glazed from a tool failure, a light truing cut shall be taken to make sure that the test cut is uniform throughout.

6. *Test cuts.* When tests are being made on standard machine tools, in which the speed steps are relatively coarse, it is recommended that the piece to be cut be long enough to insure the destruction of the cutting edge of the tool in a single pass over it.

7. *Coolant.* All standard results shall be based on dry cutting, although additional work showing the effect of coolant is highly desirable.

There are relatively few published data covering the feeds and speeds which may be used with modern cutting tools. The Bureau of Standards has done valuable work on high-speed-steel tools, cutting machinery, and nickel steel, and has also done some work with cemented tungsten carbide. A great opportunity exists for the collection of data on the cutting of all the usual materials of machine construction, particularly cast iron, brass, bronze, aluminum, chrome-nickel steel, and cast steel. The author believes that it is the responsibility of the manufacturers of cutting tools to furnish a series of curves showing the performance of their tools, with the various metals commonly cut. At present the sale of tools is based on general performance that cannot be checked by the purchaser. Should data on a known basis be put in the hands of the shop executive, enabling him to set accurate feeds and speeds for various jobs and allowing him to check results from time to time, this important part of the work of the shop would be put on a much more satisfactory basis. Such data could be made up along the lines outlined in this article. Tools believed to be defective could be checked against a known standard. Companies having a superior product would be in a position to prove it. Production from existing equipment could be appreciably increased. Finally, a great step would be made toward the putting of the cutting of metals on the scientific basis which Frederick W. Taylor visualized.

Annual Meeting of Mining Correlating Committee

The twelfth annual meeting of the Mining Standardization Correlating Committee was held on February 22, 1933, during the sessions of the Annual Winter Meeting of the American Institute of Mining and Metallurgical Engineers. The following officers of the committee, who are also members of the Executive Committee, were re-elected:

E. A. Holbrook, dean, College of Engineering, University of Pittsburgh, Pittsburgh, Pa., *chairman*

Warren R. Roberts, Roberts and Schaefer Company, Chicago, Ill., *vice chairman*

Lucien Eaton, Milton, Mass., *vice chairman*

The other members of the Executive Committee were also re-elected. They are:

Rush N. Hosler, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.

W. E. Goodman, Goodman Manufacturing Company, Chicago, Ill.

W. Val DeCamp, Berkeley, Calif.

Changes in personnel that have taken place since the meeting of February, 1932, are as follows:

R. E. Simpson, the Travelers Insurance Company, Hartford, Connecticut, replacing Walter S. Paine, Aetna Life Insurance Company, as representative of the National Bureau of Casualty and Surety Underwriters

Thomas E. Lightfoot, engineer in charge of accident prevention and compensation, Koppers Coal Company, Pittsburgh, Pa., replacing Rush N. Hosler, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa., as representative of the National Safety Council

Consideration was given by the committee to the recent submittal by the American Mining Congress of Frogs, Switches, and Turnouts for Coal-Mine Tracks (M7a-1933) as a revision of a previous standard approved in 1927 under project M7. As a result of discussion, favorable recommendations to Standards Council were unanimously voted. As noted on page 75 of this issue, this document is now approved as American Recommended Practice.

Discussion of protective clothing in mines brought out recent advances in the design and use of this material, and further investigation of the necessity for protecting clothing is to be studied by the American Mining Congress.

ASA PROJECTS

Transportation, Ferrous Metallurgy, and Non-Ferrous Metallurgy Projects

The sixth of a series of reviews of standardization projects under the procedure of the American Standards Association

The status of all projects concerning transportation, ferrous metallurgy, and non-ferrous metallurgy projects under ASA procedure is summarized in the following review. The data presented in this review are taken from the files of the American Standards Association and are corrected to March 1, 1933, bringing up to date the review of transportation, ferrous metallurgy, and non-ferrous metallurgy projects published in the issue of April, 1932.

E2-1923—Design for Joint Plates for Seven-Inch Girder-Grooved and Guard Rails

E3-1923—Design for Joint Plates for Nine-Inch Girder-Grooved and Guard Rails

E4-1923—Design for Seven-Inch Girder-Grooved Rail

E5-1923—Design for Nine-Inch Girder-Grooved Rail

E6-1923—Design for Seven-Inch Girder-Guard Rail

E7-1923—Design for Nine-Inch Girder-Guard Rail

Sponsor—American Transit Association.

Standards for projects E2 to E7 were developed by the American Electric Railway Association (now the American Transit Association) and approved as American Standard in 1923. New standards for E4, E5, E6, and E7, incorporating minor revisions adopted by the sponsor in 1932, were submitted by the American Transit Association in March for approval under the proprietary method.

E8-1926—Design for Seven-Inch 82-Lb Plain Girder Rail and Splice Bar for Use in Paved Streets

E9-1926—Design for Seven-Inch 92-Lb Plain Girder Rail and Splice Bars for Use in Paved Streets

E10-1926—Specifications for Special Track Work Materials

E11-1926—Design for Seven-Inch 102-Lb Plain Girder Rail and Splice Bars for Use in Paved Streets

Sponsor—American Transit Association.

This group of projects was originally handled by a sectional committee under the sponsorship of the American Electric Railway Association (now the American Transit Association). Standards for E8, E9, and E11 were approved as American Tentative Standards in 1926. Specifications for Special Trackwork Materials (E10-1929) were approved by ASA in 1929, and the sectional committee was discharged. In 1931, minor revisions, largely consisting of a rearrangement of data and notes, were found necessary. These revisions were adopted by the sponsor in 1932 and have now been submitted for approval as American Standard under the proprietary sponsorship method.

G8—Specifications for Zinc Coating of Iron and Steel

Sponsor—American Society for Testing Materials.

The status of this project is detailed below under the several sub-projects, into which the work was divided when the committee was organized in 1925.

G8a—Technical Committee I—Hardware and Fastenings. In November, 1932, this technical committee referred a tentative specification for zinc coating (hot-dip) on hardware and fastenings to letter-ballot action of the sectional committee. The latter group, at a meeting on March 8, 1933, considered the divergent viewpoints brought out by the letter ballot, but further study will probably be required before definite recommendations are presented.

The technical committee has agreed that the preparation of specifications for zinc coatings by electro-

galvanizing, sherardizing, and spraying processes is not warranted at the present time. The first of these processes is under investigation by service and laboratory tests, which are incomplete; and the second and third processes are still of minor commercial importance.

G8b—Technical Committee II—Sheets and Sheet Products. As a result of recommendations from this technical committee, which were accepted by the sectional committee and endorsed by the sponsor, Specifications for Zinc-Coated (Galvanized) Sheets (A.S.T.M. A 93-27) were approved as American Tentative Standard in 1931 as G8b1-1931. Consideration has been given to possible revisions of this standard but no action has been taken.

G8c—Technical Committee III—Structural Steel Shapes, Plates, Bars, and Their Products. During the past year an investigation of the embrittlement of structural steel in the galvanizing process, carried on at the Battelle Memorial Institute under the direction of A.S.T.M. committees and groups representing certain public utilities, yielded information of direct value to this technical committee. As a result of this work and in accord with recommendations from certain A.S.T.M. groups, the technical committee has recommended minor revisions in the American Tentative Standard on Zinc (Hot Galvanized) Coatings on Structural Steel Shapes, Plates, and Bars, and Their Products (G8.1-1930) (A.S.T.M. A 123-30). These questions are now before the sectional committee.

G8d—Technical Committee IV—Pipe Conduits and Their Fittings. Adjustments to care for objections raised within the sectional committee to certain sections of A.S.T.M. A 120 have not been completed by this technical committee. These objections were registered a year ago when A 120 was before the sectional committee following favorable recommendations of the technical committee.

G8e—Technical Committee V—Wire and Wire Products. During the past year several A.S.T.M. standard and tentative standard specifications for zinc-coated wire and wire products have been under consideration by the technical committee working in close cooperation with Subcommittee VI of A.S.T.M. Committeee A-5 on Corrosion of Iron and Steel, but no recommendations have as yet been transmitted to the sectional committee by this technical committee.

G8g—Technical Committee VII—Methods of Testing. Technical Committee VII, also functioning as Subcommittee VII of A.S.T.M. Committee A-5 on Corrosion of Iron and Steel, has continued its investigations of field and laboratory tests of zinc coatings.

G9—Specifications for Carbon-Steel and Alloy-Steel Blooms, Billets, and Slabs for Forgings

Sponsor—American Society for Testing Materials.

In 1924 this standard was submitted by the American Society for Testing Materials and was approved as American Tentative Standard. A revised document (A.S.T.M. A 17-29) was adopted by the Society in 1929 and submitted to ASA for approval under the proprietary method. Consideration of this specification has been deferred, pending receipt of further information from the sponsor.

G12-1931—Specifications for Refined Wrought-Iron Bars

G13-1931—Specifications for Wrought-Iron Plates

Sponsor—American Society for Testing Materials.

These specifications were approved in 1931 as American Tentative Standards under the proprietary method. No revisions are under way. The A.S.T.M. designations are respectively A 41-30 and A 42-30.

H1—Zinc and Zinc Ores

Sponsor—American Society for Testing Materials.

The development of standards under the scope of this project has been deferred until industrial requirements become more definite.

H4-1928—Specifications for Soft or Annealed Copper Wire

H14-1929—Specifications for Hard-Drawn Copper Wire

H15—Specifications for Medium Hard-Drawn Copper Wire

H16-1928—Specifications for Tinned Soft or Annealed Copper Wire for Rubber Insulation

Sponsor—American Society for Testing Materials.

Standards for three of these projects, which are under the supervision of a single sectional committee, were approved in 1928 and 1929 as follows: H4-1928 (A.S.T.M. B 3-27), H14-1929 (A.S.T.M. B 1-27) and H16-1928 (A.S.T.M. B 33-21). A.S.T.M. Specifications for Medium Hard-Drawn Copper Wire (H15) (A.S.T.M. B 2-27) are still under consideration by the sectional committee. Two of the approved standards—H16-1928 and H4-1928—used as basic wire

standards by the sectional committee for project C8, Specifications for Insulated Wires and Cables (Other than Telephone and Telegraph), have also been published as C8b1-1928 and C8b2-1928, respectively.

H7-1925—Specifications for Brass Forging Rod

Sponsor—American Society for Testing Materials.

This standard (A.S.T.M. B 15-18), approved in 1925 as American Tentative Standard following submittal by the American Society for Testing Materials, has not been changed and no revisions are under way.

H8—Specifications for Free-Cutting Brass Rod for Use in Screw Machines

Sponsor—American Society for Testing Materials.

Consideration of a revised document for this project has been deferred, pending the submission by the A.S.T.M. of further information. The A.S.T.M. designation of the revised document is B 16-29.

H11-1924—Specifications for Solder Metal

Sponsor—American Society for Testing Materials.

This specification (A.S.T.M. B 32-21), for which the Society is sponsor, was approved in 1924 as American Tentative Standard. Revisions are not under consideration.

H13-1925—Outside Dimensions of Plumbago Crucibles for Non-Tilting Furnaces in Non-Ferrous Foundry Practice

Sponsors—American Foundrymen's Association; Plumbago Crucible Association.

Originally developed by the Plumbago Crucible Association, this standard was approved as American Tentative Standard in 1925. No revisions have been made.

H17—Specifications for Ingot Copper

Two A.S.T.M. standards, submitted in 1929 under the proprietary sponsorship method, were approved in 1932. The titles and designations are as follows:

H17.1-1932—Specifications for Lake Copper Wire Bars, Cakes, Slabs, Billets, Ingots, and Ingot Bars

H17.2-1932—Specifications for Electrolytic Copper Wire Bars, Cakes, Slabs, Billets, Ingots, and Ingot Bars

H19—Specifications for Sheet High Brass

The specification (A.S.T.M. B 36-27), a revision of an earlier standard which had been approved in 1924, was submitted by the American Society for Testing Materials under the proprietary method in 1929. In 1932, A.S.T.M. Committee B-5 on Copper and Copper Alloys recommended certain revisions. Pending consideration by the Society, action by ASA on these specifications has been withheld.

H20—Specifications for Manganese Bronze Sand Casting

H21—Specifications for Manganese Bronze Ingots for Sand Castings

Consideration of these two specifications (A.S.T.M. B 54-27 and B 7-27), which were submitted by the American Society for Testing Materials in 1929, has been withheld due to deliberations regarding changes in their provisions now under way in A.S.T.M. Committee B-5 on Copper and Copper Alloys.

ASA Initiates Project on Safety Glass

The American Standards Association, through action by its Standards Council, has formally initiated a project for the development of specifications and methods of test for safety glass used in the glazing of windows of automobiles, aircraft, and ships. The project will also cover so-called bullet-proof glass and laminated glass used in industrial goggles.

The initiation of the project was requested by the National Bureau of Casualty and Surety Underwriters and sponsorship has been assigned to the Bureau and the National Bureau of Standards. A sectional committee is now being organized by the sponsors.

In 1906 when the first patents for the manufacture of laminated glass were assigned in this country there were only about 100,000 automobiles on the road. Consequently, there was no automobile accident problem as we know it today to focus attention on glass hazards. It was not until 1927 that automobile manufacturers began to offer safety glass as either standard equipment or optional at a slight extra cost, in order to meet the growing demand for protection from injury due to broken glass.

Some specifications for this type of safety glass have been developed in the United States. The Federal Specifications Board has recently developed

specifications for use by the various divisions of the Federal government. The Commonwealth of Massachusetts has a group of specifications to which all laminated glass installed in motor vehicles registered in Massachusetts must conform. Several other states, while not having in effect specifications, have passed laws and regulations requiring the use of laminated glass in certain classes of motor vehicles.

The German national standardizing body, Deutscher Normenausschuss, organized a technical committee about a year and a half ago to develop methods of testing safety glass. Two draft standards have been prepared by the committee. One deals with safety glass for goggles and the other with safety glass for vehicles. The work of the German committee will be made available to the American committee and there will be an interchange of experience and thought as the work of the two committees progresses.

ASA Approves Industrial Inch-Millimeter Ratio

The value 25.4 has been approved by the American Standards Association as the American Standard inch-millimeter conversion ratio for industrial use. This ratio, with three conversion tables based on it, and recommendations for the rounding of converted values, are included in the American Standard B48.1-1933.

This American Standard, the first one to be established by the general acceptance method, has passed through all the phases of its development by unanimous decision. The general conference of industry held on October 21, 1932, under the auspices of ASA, made the recommendation that the proposed standard be submitted to American industry for written acceptance. Accordingly, more than 100 organizations were canvassed by the ASA office and a large number of acceptances were received, no objection to the proposed standard being made. The standing committee which submitted the draft to the general conference and, after completion of the canvass of industry, made a recommendation for approval to ASA (being authorized to do so by the general conference) consists of the following members:

C. B. Veal, Society of Automotive Engineers, representing the SAE, *chairman*
L. F. Adams, General Electric Company, representing the National Electrical Manufacturers Association
H. W. Bearce, Division of Weights and Measures, National Bureau of Standards, representing the Bureau of Standards
F. O. Hoagland, Pratt and Whitney Company, representing the National Machine Tool Builders' Association
C. E. Johansson, Ford Motor Company
C. B. LePage, American Society of Mechanical Engineers, representing the A.S.M.E.
P. V. Miller, Taft-Peirce Company, representing the Gage Manufacturers' Association

While the major part of the task of this committee has now been completed, there are two more subjects on which it will make recommendations in accordance with the instructions of the general conference. One recommendation will concern the publication by ASA of more extensive standard conversion tables based on the ratio 25.4, in addition to those given in the new American Standard. Industry will be canvassed to ascertain what its wishes are in this respect. The other subject is the development of a proposal to apply the system of rounding of numerical values, as recommended for inch-millimeter conversions, to industrial work in general.

The new American Standard B48.1-1933 is now being printed.

Revised Standard for Bolts and Nuts

A revision of the American Tentative Standard for Wrench-Head Bolts and Nuts and Wrench Openings (B18b-1927) has been approved by the American Standards Association as the American Standard B18.2-1933. This revision differs from the 1927 edition mainly in that tables for "heavy" bolt heads and nuts have been added to the original smaller "regular" series. The addition of the heavy series was requested by the manufacturers of valves and fittings and the users of pipe lines in connection with the relatively large clearance that must be left between the bolt shank and the hole, in making flanged pipe connections.

The new standard contains eight tables covering the following subjects:

1. Square and hexagon bolt heads (unfinished, semi-finished, and finished) in the regular series (sizes ¼ to 3 in.), and in the heavy series (sizes ½ to 3 in.)
2. Square and hexagon nuts and jam nuts (unfinished, semi-finished, and finished) in the regular series (sizes ¼ to 3 in.), and in the heavy series (sizes ½ to 4 in.)

3. Light nuts (hexagon, semi-finished), in sizes ¼ to 1½ in.
4. Cap screw heads (hexagon), sizes ¼ to 1¼ in.
5. Light castle nuts (hexagon), sizes ¼ to 1½ in.
6. Machine screw and stove-bolt nuts (square and hexagon) in numbered sizes (0 to 12), and ¼, 5/16, and ⅜ in.
7. Set screw heads (square), sizes ¼ to 1½ in.
8. Open end wrench openings for regular, heavy, and light series of bolt heads and nuts.

The American Society of Mechanical Engineers and the Society of Automotive Engineers are sponsors for the project. The standard is being published by the American Society of Mechanical Engineers and may be purchased from the A.S.M.E., the SAE, or from the American Standards Association, at 45 cents per copy. Members of ASA are entitled to the usual discount.

Standards and Projects for Gas-Burning Appliances

Since the organization in 1930 of the Approval Requirements Committee of the American Gas Association into a sectional committee of the American Standards Association, eight approval requirements have been formally approved, while work on 13 further subjects is progressing.

Early in 1932 the first approval requirements to be submitted, those on gas ranges (Z21a-1932), were approved as American Recommended Practice. These requirements have since been taken under revision.

Later in 1932, the following six requirements were submitted, and were formally approved as American Standards:

Approval Requirements for Flexible Gas Tubing (Z21.2-1932)
Approval Requirements for Hotel and Restaurant Ranges (Z21.3-1932)
Approval Requirements for Private Garage Heaters (Z21.4-1932)
Approval Requirements for Clothes Dryers (Z21.5-1932)
Approval Requirements for Incinerators (Z21.6-1932)
Approval Requirements for Gas-Heated Ironers (Z21.7-1932)

Requirements for Installation of Conversion Burners in House-Heating and Water-Heating Appliances (Z21.8-1933) had in the meantime been submitted to ASA, but action was postponed pending reconciliation of conflicts with the Code for City Gas (Z27-1933) which had been submitted by the National Fire Protection Association. The correlation of the two documents having been attained, the Requirements for Installation of Conversion Burners in House-Heating and Water-Heating Appliances (Z21.8-1933) were approved as American Standard[1] in January, 1933. These requirements, as well as the six approved in the latter part of 1932, were discussed by R. M. Conner, Director of the A.G.A. Testing Laboratory, in the March issue of INDUSTRIAL STANDARDIZATION.

The remaining 13 subjects on which work is going forward under the sponsorship of the American Gas Association are:

Approval Requirements for Gas Fired Refrigerators (Z21b)
Listing Requirements for Gas, Pressure, and Temperature Control Accessories (Z21d)
Approval Requirements for Gas Water Heaters (Z21e)
Approval Requirements for Central-Heating Gas Appliances (Z21f)
Approval Requirements for High-Pressure Gas Boilers (Z21g)
Approval Requirements for Space Heaters (Z21k)
Approval Requirements for Hot Plates and Laundry Stoves (Z21o)
Installation Requirements for House Piping and Appliances (Z21p)
Listing Requirements for Draft Hoods (Z21q)
Listing Requirements for Gas Range Cocks (Z21r)
Listing Requirements for Semi-Rigid Gas Tubing and Fittings (Z21s)
Approval Requirements for Unit Heaters (Z21t)
Listing Requirements for Conversion Burners (Z21u)

Rock Dusting Saves Lives

Rock dusting is being credited with the saving of the lives of 67 miners at the No. 1 mine of the Calumet Fuel Company, Delcarbon, Colorado. A mysterious explosion that killed one miner and seriously injured another is claimed to have been neutralized by rock dust.—*Reprinted from "Coal Mining," January, 1933.*

[1] This standard has been published by the American Gas Association and is available at 40 cents per copy. ASA members are entitled to the usual discount.

Standard for Use of Gas Piping and Fittings

A comprehensive code covering the installation, maintenance, and use of piping and fittings for city gas (Z27) has been approved by the American Standards Association as American Recommended Practice, following its submittal by the National Fire Protection Association. The code embraces practically every point of gas installations in buildings from the entry of the lines into buildings to the connections to appliances. It states the precautions to be observed by gas fitters installing or repairing piping, and provides standard methods of inspection and test to assure the safety of the installation. This includes provisions to make certain that gas-burning appliances shall be installed only where there are proper ventilating facilities.

The code was submitted for approval as an existing standard after 12 years of experience with earlier editions. The promulgation of the original code followed several years of work on the subject by a committee of the National Fire Protection Association.

Preliminary to the approval of the code by ASA, a critical comparative study was made of its provisions with the extensive series of requirements for various types of gas-burning appliances which have been developed by a sectional committee (Z21) under the sponsorship of the American Gas Association. In this way these standards have been brought into complete harmony.

The National Fire Protection Association has been designated sponsor for the project under ASA procedure and future revisions of the code will be handled by a sectional committee.

Standard for Coal-Mine Tracks Approved by ASA

A revised standard, Frogs, Switches, and Turnouts for Coal-Mine Tracks (M7.1-1933), has been approved as American Recommended Practice. The revised document covers part of the scope for the project on Coal-Mine Tracks, Signals, and Switches and presents a more comprehensive treatment than the former standard, which was approved in 1927. Under the sponsorship of the American Mining Congress, the sectional committee through an active subcommittee under the chairmanship of R. L. Ireland, Jr., vice-president of the Hanna Coal Company, Cleveland, Ohio, canvassed the industry on several occasions and considered a number of drafts in order to develop satisfactory designs of these important parts of coal-mine tracks.

F. C. Hohn, of Hazleton, Pa., is the chairman of the sectional committee and Mrs. E. R. Coombes of the American Mining Congress is serving as secretary.

Copies of this standard may be obtained from the American Mining Congress, Munsey Building, Washington, D. C., or from the American Standards Association.

Annual Meeting of Committee on Classification of Coal

The annual meeting of the Sectional Committee on Classification of Coal (M20) was held in New York on February 22. The meeting consisted of successive sessions of the three technical committees, on Use Classification, on Scientific Classification of Coal, and on Marketing Practice, in which the entire sectional committee participated.

Consideration of a recently proposed tentative classification of coal indicated that the fixing of definite boundary lines between different classes of coal required intensive study. From discussion it became evident that no further progress could be made in the classification of coal unless governmental agencies, both state and national, could be induced to make it their official duty to assign a part of their staff to the actual work of making the necessary study whereby exact boundary lines for classification of coal could be set up. Accordingly, a new subcommittee consisting of representatives of governmental agencies in the United States and Canada, with W. A. Selvig of the Pittsburgh Experiment Station of the U. S. Bureau of Mines as chairman, was set up to give attention to this problem.

It was also decided by the sectional committee to organize a Technical Committee on Nomenclature, in view of the use of various names in classifying coal for commercial purposes.

To facilitate early action in the formulation of tentative classifications of coal (by type and rank) for presentation at the fall meeting of the committee, W. A. Selvig was appointed executive secretary of the Technical Committee on Scientific Classification of Coal.

A key symbol for coal, which is being developed by the Technical Committee on Scientific Classification, and which will place a coal in its proper position both as to scientific classification and as to its most practical factor in use—its Btu value as pur-

chased—was suggested by Dr. H. J. Rose of the Mellon Institute.

It was decided to appoint a subcommittee of the Technical Committee on Scientific Classification to correlate the requirements of coal for various uses with the classes of coal outlined by the technical committee; in other words, to fit the uses of coal into the scientific classification system.

Reports considered at the meeting included one on the properties of lignite suitable for combustion in the pulverized form submitted by Dr. A. W. Gauger of Pennsylvania State College; a report entitled "A Classification of Coals for Use in the By-Product Coking Industry" prepared by the Mines Department of Canada; "The Use Classification of Coal for Stationary Steam Generation" which is being published by the American Institute of Mining and Metallurgical Engineers; and data obtained by the Pittsburgh and Seattle Stations of the Bureau of Mines on the agglutinating value, slacking indices, and friability of various American coals in relation to their classification presented by A. C. Fieldner, chief engineer, Experiment Stations Division, U. S. Bureau of Mines, chairman of the committee.

It was reported by R. E. Gilmore, of the Mines Department of Canada, chairman of the A.S.T.M. Subcommittee on Methods for Determining Friability of Coal, that the laboratories of the Mines Department at Ottawa have been studying various methods for determining the grindability index of coal and also for determining friability or resistance to degradation of coal on handling. The results of this work, which is being conducted in cooperation with Committee D-5 on Coal and Coke of the American Society for Testing Materials, will be published in mimeographed form within the next three months.

Ball Bearing Standards to be Published

With reference to the announcement of the revised American Standard for Annular Ball Bearings, Single Row Type (B3.1-1933) in the February issue of INDUSTRIAL STANDARDIZATION, it will be of interest to the users of ball bearing standards that the types so far approved by the American Standards Association are expected to appear in three separate pamphlets, as follows:

American Standard for Radial Ball Bearings, Single Row Type and Separable (Open) Type (B3.1-1933)

American Recommended Practice for Annular Ball Bearings, Wide Type (B3.2-1930)

American Standard for Annular Ball Bearings, Angular Contact Type (B3.3-1933)

The designation B3.2-1930 replaces the former designation B3b-1930 of the American Recommended Practice in question. Although the latter has not been revised, the change in designation has been made for the sake of uniformity.

An extension of the series of angular contact bearings is expected to be submitted soon to ASA for approval, and if approved, will be printed, together with the series which has already been approved, in the American Standard B3.3-1933.

Kansas Will Use ASA Codes

Another advance in the nation-wide adoption of the safety codes approved by the American Standards Association has been recorded in a factory inspection agreement recently adopted in the State of Kansas. This agreement, representing the consensus of opinion of the representatives of the employers of labor, the insurance carriers, and the state commissioner of labor, includes the following provision:

> "It is understood and agreed that in making inspections as provided for in these resolutions, the standards set forth in the existing safety codes of the American Standards Association shall be observed. In such instances as are not covered by an existing code of the American Standards Association, the standards set forth in the *Handbook of Industrial Safety Standards* of the National Bureau of Casualty and Surety Underwriters shall be observed, with the provision that the standards of this *Handbook* shall be replaced by equivalent safety codes of the American Standards Association as and when such are adopted and issued by that Association; provided in the event a conflict should arise between the existing code and the statutes of the State of Kansas, the statutes of the State of Kansas shall prevail."

This action by the State of Kansas brings that state into line with New York, New Jersey, Pennsylvania, Ohio, Nebraska, California, Maryland, Kentucky, North Carolina, and Virginia, which are either adopting American Standard Safety Codes verbatim or are using such codes as the basis of their safety standards.